Field-theory approach to ESR in quantum spin chains(New Developments in Strongly Correlated Electron Systems)

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Bandwidth controlled metal-insulator transitions

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I will discuss on the nature of transitions between metals and Mott insulators controlled by relative ratio between the onsite Coulomb repulsion and the transfer at half filling by taking the extended Hubbard models with longer ranged transfer. The results obtained by recently developed path-integral renormalization group method clarify qualitatively different structure of metal-insulator and magnetic transitions from that expected from the Hartree Fock approximation.

Field-theory approach to ESR in quantum spin chains

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A field-theory approach to ESR in quantum spin chains at low temperature is developed. Based on the Feynman-Dyson self-energy formalism, a systematic framework to calculate the ESR lineshape is presented. The lineshape is calculated perturbatively and non-perturbatively, giving consistent results with the existing experiments, including those on Cu benzoate. Based on our results, we also make a critical re-examination of the previous theories on ESR, which is expected to be valid at higher temperature.